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ABSTRACT

A study was undertaken to determine what research, principles, and suggested practices in the field of psychology could be found to support development of certain teaching competencies that had been outlined in previous research. The competencies considered are course planning, course content, instructional procedures, learning materials use, and student evaluation. The findings of this study are reported, and attitudinal barriers to the improvement of instructional practice are discussed. A brief bibliography is included. (MSE)

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PSYCHOLOGY AND TEACHING AND LEARNING

A MILITARY ANALOGY

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PSYCHOLOGY AND TEACHING AND LEARNING

A MILITARY ANALOGY

An uneasy haze rests over the fields where the troops devoted to learning are encamped. To the south and in neat array are the battalions whose banners read "association", "reinforcement", and "long-term memory". Scattered to the east and west are smaller groupings, some flying the standard of "excellence", others obviously devoted to "science", "humanities", or "professional training". In the northern hinterland lies a camp flying the banner "behavioral objectives", but close observation reveals small parties, sometimes of officers, sometimes of troops, straggling out of the camp to the east and the west. The regiments appear to have been in position for some time now, and the haze of uncertainty emanating from the field looks as if it is due to indecision: the battalions do not know whether to consolidate forces against crass ignorance and decrepit incomprehension, or to do battle with each other.

Taking tongue from cheek, I would argue that it is the northern battalion that has led to a gathering of the troops, and it is the same battalion that has left matters in such an indecisive state. Behavioral objectives brought the promise of measurability and hence accountability to education. They were such a powerful tool that troops deserted their own camps to follow, somewhat blindly, the new banner. Their introduction posed a threat in the older regiments where howls of protest could be heard. Like nuclear arms, their entry caused considerable dislocation among the conventional forces in the field. With the try-out and shakedown of the new battalion, however, has come an understanding of the utility and mutual dependence of the different forces. The troops are still in need of a leader, but at least they have begun to trade intelligence. It is a few of these military secrets that I want to share with you.

I will begin by talking about teaching competencies, which probably constitute the kitchen patrol in the learning army. For the last four years we have been involved in a project to determine what armament university professors have or need to have. The project began when I tried to individualize a course on teaching strategies and found that different elements of the teaching process (a) could be delineated, and (b) cast different perspectives on the teaching process. Three years of working with professors in course evaluation and improvement unearthed what I feel are a couple of important discoveries, and laid to rest one or two old and debilitating myths.

What the teaching platoon has to tell psychology is, first, that although "teaching" is generally considered to be and is rewarded for being classroom presentation, it is, in fact, only a small part of the teaching act. The "teaching as presentation" attitude is one reason for the continued popularity of the lecture, and the saleability of classroom videotaping as a means of improving instruction in the university. An early finding in our study, however, was that the majority of teaching improvements which professors intended to make would be in the realm of planning rather than presentation. All of the improvements that professors intended to make involved planning time; a smaller proportion involved presentation time as well. Of the twenty-two teaching elements we uncovered, only six of them dealt with in-class instructional questions (see Appendix A).

The second finding, spearheaded by Marg Penney's research into self and student evaluation, was that professors considered different teaching competencies important from what students thought important. Students tend to be more concerned about subject matter knowledge and classroom interaction, but, understandably, lack insight into the need for important planning steps such as assessing student entry skills or the evaluation of learning. The movement in support

of using student ratings to evaluate teaching has continued to gather strength, but without the proviso that the student perspective, although valuable, does not provide a complete picture of the teaching act.

A third finding was that, contrary to the widely-held myth that professors considered their curriculum to be their exclusive territory, so that instructional improvement should not intrude into the area of course content, professors welcomed the possibility of a course content analysis with enthusiasm. Given the opportunity to discuss and test their content organization, they entered into a project of course content analysis requiring much time and thought expenditure.

All the secrets are not hidden in the teaching platoon, however, and I was interested as a psychologist and an instructional developer to find out how much information about teaching could be gleaned from the confidential files of the psychologists. The search began when a McGill professor, charged with ensuring teaching excellence in her department, posed the question: "Where should we begin to improve our teaching?" To answer the question, we studied the literature to see what psychological research, principles, and suggested practices we could find to support the teaching competencies which we had previously delineated on the basis of teachers' needs and teaching evaluation instruments.

Course Planning

The first area of teaching competencies, course planning, consists of three elements: creation of a learning system, the goals and objectives of the course, and the assessment of student entry skills. We are indebted to biology for the idea of "system" but to management science for the development of human interaction systems of which the teaching-learning system is one. Course planning is an operationalization of systems theory applied to instruction. One of the first applications of the concept "system", or "a pattern of relationships with a purpose" is in the delineation of goals and objectives in a course.

When the use of behavioral objectives was first suggested, academics leapt back in horror at implied limitations to freedom. Research on the use of objectives has, however, provided evidence that not only is learning generally more efficient when they are used, but that they aid in the representation of knowledge. The professor who sets course objectives has the opportunity to discern the pattern of relationships in his or her course, and to infer the intellectual abilities that students in the course will require. This dovetails with a growing interest of professors in assessing the entry skills of students. Educational psychologists such as Glaser (1977) have been calling for attention to be paid to the "initial state of the learner" and our university teachers ranked it far ahead of any other concern for teaching improvement. Research on aptitude-treatment interactions has highlighted the need to understand the variety of student aptitudes, the learning skills critical to success, and the instructional tasks or treatments that will develop these skills.

Course Content

A major impetus has been given to the ranks of curriculum planners by research and development in conceptual learning. The meaningful learning squadron, at times flying solo and at others coming close to crashing, has developed flying machines such as tree structuring and content analysis which have turned out to be able to travel some distance and carry some weight. From advance organizers we have moved to knowledge networks and key concepts, to methods of inquiry, and encoding and retrieval analysis. If we have not yet produced a jumbo jet, we are at least in the air. The prototype jet appears to be Gagne's (1977) hierarchical analysis of learning, a description of the relationships of positive transfer among intellectual skills.

But there are many psychological principles that have been applied to learning in higher education and have been found to hold. One example is the inter-

action between student learning time and how material is organized. If students are memorizing information, learning becomes inefficient when the task length exceeds immediate memory span. If material is meaningfully or highly organized, however, the task size can be increased with no disproportionate increase in learning time. Logical structure, lucidity, and sequentiality are more important factors in learning difficulty than is amount of material (Erskine and O'Morchoe, 1961; Stolurow, 1971).

Researchers in the area of verbal learning have passed along secrets about potential causes of difficulty in learning. Factors such as word frequency, concreteness, and imageability affect difficulty level. Providing key terms or observable examples, and defining concepts in terms of their attributes have proven to be useful applications.

Work in the area of epistemic motivation and arousal has also been successfully applied. Since Berlyne's (1960) work on conflict, arousal and curiosity, applied research has verified that cognitive variation, flexibility, and variety in instructional materials, types of tests, and teaching methods all work to produce better learning. Educational technologists have taken the quest one step further to provide methods of affecting attention and selective perception. How prequestions function, for example, by arousing conflict or incompatible responses, which lead to better retention, has been the subject of study (Bull and Dizney, 1973).

Instructional Procedures

The major findings in instructional procedures can be grouped under the headings "presentation" and "interaction". Presentation is concerned with classroom management and the effects of pace and variety in the presentation of material. Knowledge of the human information processing system has provided

numerous ideas to be used in the presentation of information. Attention to the different conditions required for different students and different kinds of learning has led to the possibility of greater sophistication in instructional method (Bloom et al., 1956; Merrill and Boutwell, 1973; Shalock, 1976).

The importance of interaction in the classroom revolves around the principle of active responding on the part of the learner. In higher education, the method most fully developed to implement this principle is that of questioning. Both in the United States, as at the University of Massachusetts Clinic to Improve University Teaching, and in Canada, as at the University of Manitoba, skills in asking and responding to questions are focussed upon. But other approaches such as tutorials, oral summary and group methods have also been documented for use. These methods result in greater arousal and attention, increased higher level learning, and a more positive attitude toward the subject matter. In addition to the benefits of student-teacher interaction, greater student participation has been shown to affect both cognitive and personality development. Methods such as peer-tutoring have been shown to lead to increased critical thinking ability, motivation and independence (McKeachie and Kulik, 1975). Games and simulations and independent study or contracted learning are other ways in which students can be more active participants in their own learning.

One area in which few university professors have responded in the past is that of determining and responding to student interests. Since Hull's time (1943), psychological theory has recognized the importance of motivational variables for learning. Students rank responsiveness to their interests high when they rate professors, but professors for the most part have not yet included this item in their job description. Perhaps the new interest we see in assessing students' entry skills is the beginning of a change in attitude. We may take

note that the frequency and strength of student-faculty informal relationships is positively related to academic performance and self-perceived intellectual and personal student growth (Pascarella and Terenzini, 1978). When faculty do take an interest in their students' interests they report a greater sense of personal effectiveness (Wilson and Gaff, 1975).

Learning Materials

The learning materials chosen or created for a course can exert a profound effect on learning and retention. Along with the information explosion and the expanded role of the professor, the effect of learning materials has become more critical and more noticeable. Although programmed learning texts gave us our first insights into the effects of text, in higher education, methods such as modular instruction have allowed us to study the differences made by good or bad text. There are three dramatic findings. First, the structure of materials has a major effect on learning time and retention (Frase, 1975; Johnson, 1973). Second, learning materials can be designed to create different demands on the learner: for meaningful rather than rote learning; for discriminating or forming relations; or for developing problem solving abilities (Anderson, Goldberg and Hidde, 1971; Dansereau, 1977). Third, the use of one medium to reinforce another can result in considerably more learning and better retention (Schramm, 1955; Sherman, 1976).

Evaluation of Learning

The last area of teaching competencies, the evaluation of learning, is one that students are peculiarly silent about, except when it is a question of a better grade. It is an area that professors have been known to avoid on the premise that time spent on evaluation is lost teaching time. But this is not so, for a very important reason: students, it has been found, distribute their study

time and apportion their learning efforts in direct proportion to the predicted likelihood of various topics and kinds of information being presented on examinations (Keislar, 1961). Students use examinations to identify the important principles, or concepts to be learned. Evaluation can be used to motivate meaningful learning if students know when and how they will be tested. Frequent testing can be used to affect both the direction and intensity of learning (Saupe, 1961).

One potential reason that students avoid comment on evaluation is the uncertainty and anxiety which surround it. Using fair and clear evalaution procedures should allay some of that anxiety. The most important use of evaluation is, however, to provide feedback to both students and professors about where learning has occurred and in what areas more work is required. A multitude of studies have established that frequent quizzing and feedback of results have a beneficial effect on student learning (Block, 1971; Born et al, 1972; Davis, 1976; McMichael and Cory, 1969; and Sheppard and MacDermott, 1970). This is especially effective for the acquisition of higher level abilities (Merrill and Boutwell, 1973). Spot testing for diagnostic purposes and classroom discussion of errors have proven highly effective (Sassenrath and Gaverick, 1965; Thielens, 1978).

As professors, we have to recognize that evaluation of learning is the most direct measure of quality of teaching. The import of this area of teaching competencies is great, therefore, for as accountability pressures continue to rise, proof of student learning will become a more important measure of a professor's ability.

Can Psychologists Make Use of these Findings?

There are two attitudinal barriers which psychology professors must leap if they want to improve their instructional practices. Throughout academia

professors appear to believe that they are selection officers for an elite corps. They may in fact be, but this attitude prevents them from taking steps to help students learn. If the well-being of the entire student population is at stake, however, course improvement and attention to the learning process follows naturally.

The second barrier for professors is the discomfort caused by attempts to apply, under sloppy and uncontrolled conditions, theories of learning that psychologists have come through their training to appreciate for their intrinsic beauty. When what have been prime examples of good form, such as "reinforcement" or "cell assembly", are found to be faded or inoperant in explaining the learning process in higher education, the psychology professor's loyalties are likely to lie with the theories rather than with the instructional process. In a small attempt to resolve this dilemma, I will conclude by suggesting a kind of chauvinism: psychologists should feel free to apply and investigate any instructional theories they happen upon because these theories owe their origin to psychology.

APPENDIX A

TEACHING COMPETENCIES

COURSE PLANNING (learning system)

1. Course plan
2. Goals and objectives
3. Assessing entry skills

COURSE CONTENT (curriculum)

4. Conceptual themes
5. Selection of content
6. Organization of material
7. Amount of material
8. Level of difficulty
9. Variety and interest

INSTRUCTIONAL PROCEDURES

10. Classroom management - preparation
11. Presentation of material - pace
12. Presentation of material - variety
13. Student-teacher interaction
14. Student participation
15. Responsiveness of teacher to students' interests
16. Availability of teacher

LEARNING MATERIALS (texts, readings, modules, etc.)

17. Choice of materials
18. Creation of materials

EVALUATION OF LEARNING

19. Evaluation procedures
20. Testing what is taught
21. Evaluation as feedback
22. Amount learned

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